

Intertidal scale worms (Polychaeta, Polynoidae and Sigalionidae) from the northern coasts of the Persian Gulf and Gulf of Oman

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Academic editors: *E. Neubert, S. Taiti* | Received 8 March 2009 | Accepted 7 August 2009 | Published 28 December 2009

Citation: Bonyadi A, Rahimian H (2009) Intertidal scale worms (Polychaeta, Polynoidae and Sigalionidae) from the northern coasts of the Persian Gulf and Gulf of Oman. In: Neubert E, Amr Z, Taiti S, Gümüs B (Eds) Animal Biodiversity in the Middle East. Proceedings of the First Middle Eastern Biodiversity Congress, Aqaba, Jordan, 20–23 October 2008. ZooKeys 31: 53–71. doi: 10.3897/zookeys.31.127

Abstract

Sampling of Polychaeta has been performed in the Persian Gulf and Gulf of Oman during December 2006 to October 2007. So far, 10 species belonging to six genera from two families have been identified. Seven species from the family Polynoidae (*Lepidonotus natalensis*, *L. purpureus*, *Parahalosydropsis arabica*, *Harmothoe hirsuta*, *H. liaoi*, *Paralepidonotus ampulliferous*) and one species from the family Sigalionidae (*Sthenelais boa*) are new records for the Gulf of Oman. *Thormora jukesii* and *H. marerubrum* (Polynoidae) are new records for the Persian Gulf. *Lepidonotus tenuisetosus* could be recorded for both gulfs. The most diverse genera in the area are *Lepidonotus* and *Harmothoe* with each of them represented by three species. The most common species was *Lepidonotus tenuisetosus*, which was collected from 25 locations. The highest diversity of polychaetes species could be observed in rocky habitats containing stones covered with algae.

Keywords

Aphroditoidea, new records, habitats, Persian Gulf, Gulf of Oman

Introduction

Scale worms form one of the major taxa within the Polychaeta. However, the knowledge on their biodiversity in the two gulfs remained fragmentary so far. For this reason an expedition from December 2006 to October 2007 to the northern coasts of the Per-

sian Gulf and Gulf of Oman was conducted with a particular focus on the collection of scale worms. During this campaign, 34 stations on the intertidal zone with different physical characteristics could be visited.

Currently, 34 species confined to five of the six currently accepted families of scale worms (Acoetidae Kinberg 1858, Aphroditidae Kinberg 1856, Eulepethidae Chamberlin 1919, Pholoidae Kinberg 1857, Polynoidae Kinberg 1856 and Sigalionidae Kinberg 1856) have been reported for the Persian Gulf. Most of them originated from the south-western parts of the Persian Gulf, and the Gulf of Oman (Wesenberg-Lund 1949; Wehe and Fiege 2002; Wehe 2006, 2007). The family Eulepethidae has not been recorded for the area so far.

In the present study we report on 10 species belonging to six genera from the families Polynoidae and Sigalionidae. Nine species represent new records, seven for the Gulf of Oman and two for the Persian Gulf.

Material and methods

The 34 collecting sites in the intertidal zone were selected according to differing habitat conditions in order to also sample more specialized taxa. The major features addressed were rocky shores, stony, sandy and muddy beaches. They were distributed along the northern coasts of the Persian Gulf to the Gulf of Oman from the Imam Khomeini jetty in the northwest to Guatr in the southeast (Fig. 1). Additional samples were taken in the intertidal zone of two islands, Qeshm and Hengam, which are located in the Strait of Hormuz (Fig. 2). Details on the collecting sites are presented in Table 1.

Collected specimens were relaxed using 8% $MgCl_2$, and fixed in 5% formalin diluted in seawater for 24h. Then, the specimens were washed with tap water and

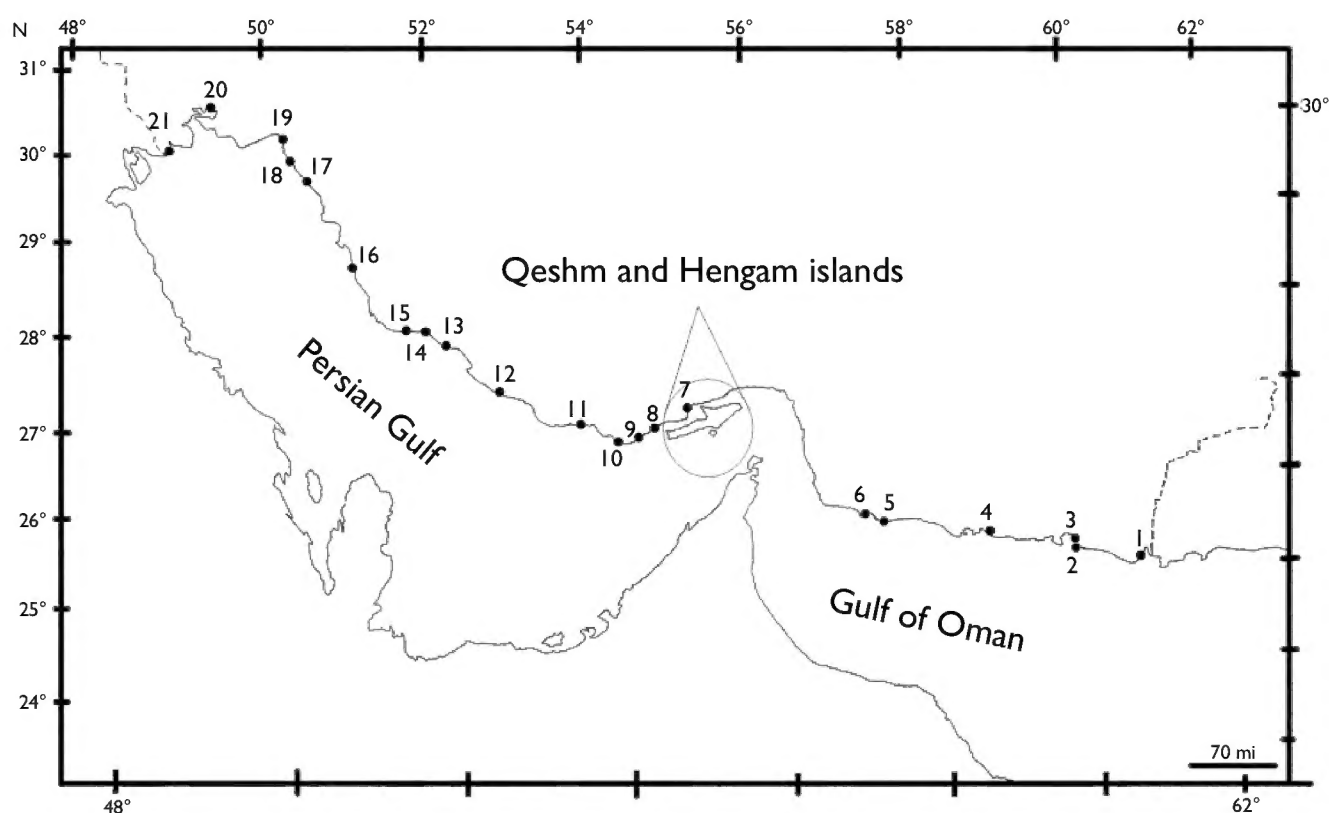


Figure 1. Collecting sites along the mainland coasts of the Persian Gulf and the Gulf of Oman.

transferred to 70% ethyl alcohol for permanent storage. The specimens were studied under the stereo microscope. Parapodia and elytra were detached, mounted in glycerin and studied under a compound microscope. Drawings were made using a camera lucida. Identification followed the identification keys supplied by Wehe (2006, 2007). All specimens reported here are deposited in the Zoological Museum, University of Tehran (ZUTC). Measurements are given in millimeter (mm) including a minimum-maximum (mean) order. Measurement of the width of animals includes parapodia and chaetae. The number of examined specimens per species is indicated by “n”.

Systematic Account

Family Polynoidae

Subfamily Lepidonotinae Willey, 1902

Lepidonotus Leach, 1816

Lepidonotus natalensis Day, 1951

Lepidonotus natalensis. — Wehe 2006, Fauna of Arabia 22: 101–103, fig. 21a–j.

Type locality: Port Edward, Natal, South Africa, Indian Ocean.

Material examined: ZUTC ann.2040

Remarks: The only specimen examined here is broken in two parts; thus, no measurements of this specimen could be taken. However, the specimen is similar to those described by Wehe (2006) except for the position of the nephridial papillae, which Wehe observed to start from segment 7 onwards, while in our fragmented specimen they start from segment 8.

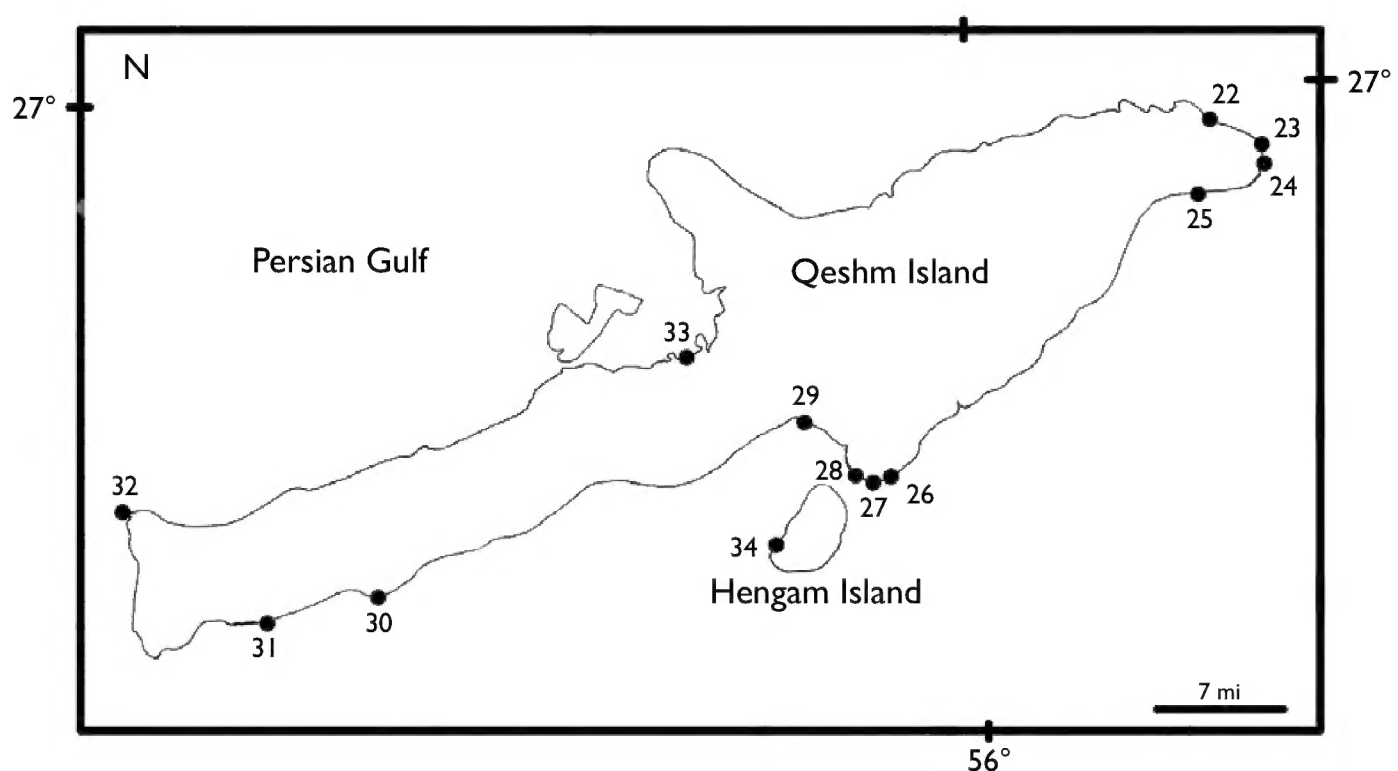


Figure 2. Collecting sites on the Island of Qeshm and Hengam.

Table 1. Table showing information about material examined, collection numbers, date and position of sampling and habitat locations.

Species name	Location name (Location number)	Location	Date	Habitat	Code	Number of specimens
<i>Lepidonotus natalensis</i> Day, 1951	Jod (4)	25°27'.07 N, 59°30'.80 E	23/04/07	Rocky-stony	ZUTC ann.2040	1
<i>Lepidonotus purpureus</i> Potts, 1910	Khor khalasi (5)	25°36' N 58°03' E	24/10/06	Mangrove	ZUTC ann.2044	2
<i>Lepidonotus tenuisetosus</i> Gravier, 1902	Sondorf (6)	25°41'.53 N 57°53'.12 E	18/04/07	Rocky-stony	ZUTC ann.2002	1
	Kong jetty (9)	26°34'.85 N 54°55'.60 E	15/02/07	Rocky-stony covered with algae	ZUTC ann.2003	5
	Majidieh (20)	30°28'.47 N 49°10'.69 E	28/09/07	Muddy covered with shelves	ZUTC ann.2004	7
	Deilam jetty (19)	30°02'.54 N 50°08'.51 E	30/09/07	Sandy	ZUTC ann.2005	25
	Imam Khomeini jetty (21)	30°28'.47 N 49°04'.12 E	28/09/07	Muddy covered with shelves	ZUTC ann.2006	1
	7 km before Shib deraz from the Qeshm city (26)	?	03/01/07	Rocky-coral	ZUTC ann.2007	2
	Charak jetty (11)	26°42'.84 N 54°09'.36 E	16/02/07	Rocky covered with algae	ZUTC ann.2008	5
	Bujikdan (16)	28°34'.59 N 51°04'.37 E	18/02/07	Sandy	ZUTC ann.2009	5
	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/04/07	Rocky-stony	ZUTC ann.2010	2
	Jod (4)	25°27'.07 N 59°30'.80 E	23/04/07	Rocky-stony, sandy	ZUTC ann.2011	5
	Oli (15)	27°49'.86 N 51°54'.06 E	20/02/07	Rocky	ZUTC ann.2012	10
	30 km after Mahtabi from the Bandar Abbas (8)	26°46'.76 N 55°15'.19 E	15/02/07	Rocky covered with algae	ZUTC ann.2013	1
	Genave Jetty (17)	29°33'.59 N 50°30'.25 E	01/10/07	Sandy-Stony	ZUTC ann.2014	36
	Jod (4)	25°27'.07 N 59°30'.80 E	19/04/07	Rocky-stony, sandy	ZUTC ann.2015	3

Species name	Location name (Location number)	Location	Date	Habitat	Code	Number of specimens
	Moghdan (12)	27°05'.72 N 53°05'.61 E	17/02/07	Rocky covered with algae	ZUTC ann.2016	3
	Parak (13)	27°38'.87 N 52°25'.30 E	18/02/07	Stony covered with algae	ZUTC ann.2017	2
	Mianloo (14)	27°46'.22 N 52°07'.77 E	18/02/07	Stony covered with algae	ZUTC ann.2018	1
	Bing Village (18)	29°44'.14 N 50°19'.29 E	30/11/07	Rocky	ZUTC ann.2019	23
	Bostane (10)	26°30'.13 N 54°38'.58 E	16/02/07	Sandy-rocky, stony	ZUTC ann.2020	2
	Qeshm Island (27)	26°41'.50 N 55°57'.28 E	27/11/07	?	ZUTC ann.2021	2
	Qeshm Island (31)	26°34'.20 N 55°23'.55 E	16/12/07	Stony	ZUTC ann.2215	8
	Qeshm Island (25)	26°55'.33 N 56°13'.49 E	15/12/07	Stony-coral	ZUTC ann.2042	27
	Qeshm Island (32)	26°39'.24 N 55°15'.53 E	16/12/07	Coral and muddy	ZUTC ann.2224	1
	Qeshm Island (30)	26°35'.39 N 55°29'.56 E	16/12/07	Stony	ZUTC ann.2232	4
	Qeshm Island (24)	26°56'.90 N 56°16'.33 E	14/12/07	Stony	ZUTC ann.2235	4
	Qeshm Island (29)	26°44'.20 N 55°52'.48 E	14/12/07	Sandy with shells	ZUTC ann.2245	1
<i>Parahalosydropsis arabica</i> Wehe, 2006	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/04/07	Rocky-stony	ZUTC ann.2038	1
<i>Thormora jukesii</i> Baird, 1865	Hengam Island (34)	26°24'.01 N 55°30'.00 E	04/01/07	Coral	ZUTC ann.2039	6
	Qeshm Island (25)	26°55'.33 N 56°13'.49 E	15/12/07	Stony-coral	ZUTC ann.2230	1
	Qeshm Island (24)	26°56'.90 N 56°16'.33 E	14/12/07	Stony	ZUTC ann.2234	2
<i>Harmothoe hirsuta</i> Johnson, 1897	Qeshm Island (22)	?	06/01/07	Rocky-stony with algae	ZUTC ann.2022	1
	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/04/07	Rocky-stony	ZUTC ann.2023	3
	Guatr (1)	25°10'.23 N 61°30'.16 E	20/10/06	Under stone	ZUTC ann.2024	1
	Chabahar (2)	25°16' N 60°40' E	22/04/07	Coral and stony	ZUTC ann.2025	5

Species name	Location name (Location number)	Location	Date	Habitat	Code	Number of specimens
<i>Harmothoe liaoi</i> <i>Barnich, Fiege & Sun, 2004</i>	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/10/06	Rocky-stony	ZUTC ann.2041	1
<i>Harmothoe marerubrum</i> <i>Wehe, 2006</i>	Hengam Island (34)	26°24'.01 N 55°30'.00 E	04/01/07	Coral	ZUTC ann.2045	1
<i>Paralepidonotus ampulliferus</i> (Grube, 1878)	Charak Jetty (11)	26°42'.84 N 54°09'.36 E	16/02/07	Rocky covered with algae	ZUTC ann.2026	2
	Qeshm Island (28)	?	03/01/07	Sandy	ZUTC ann.2027	1
	Bing (18)	29°44'.14 N 50°19'.29 E	30/09/07	Rocky	ZUTC ann.2028	1
	Imam Khomeini jetty (21)	30°28'.47 N 49°04'.12 E	28/09/07	Muddy	ZUTC ann.2029	1
	Qeshm Island (25)	?	02/01/07	Rocky-sandy	ZUTC ann.2030	2
	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/04/07	Rocky-stony	ZUTC ann.2031	1
	Hengam Island (34)	26°24'.01 N 55°30'.00 E	04/01/07	Coral	ZUTC ann.2032	1
	Oli (15)	27°49'.86 N 51°54'.06 E	20/02/07	Rocky	ZUTC ann.2033	7
	Khamir Jetty (7)	26°51'.12 N 55°34'.90 E	14/02/07	Rocky covered with algae	ZUTC ann.2034	5
	Qeshm Island (33)	?	05/01/07	Muddy	ZUTC ann.2035	1
	30 km after Mahtabi from the Bandar Abbas (8)	26°46'.76 N 55°15'.19 E	15/02/07	Rocky covered with algae	ZUTC ann.2036	5
	Kong Jetty (9)	26°34'.85 N 54°55'.60 E	15/02/07	Rocky-stony covered with algae	ZUTC ann.2037	8
	Qeshm Island (22)	?	26/11/07	Rocky-sandy covered with algae	ZUTC ann.2120	1
	Qeshm Island (31)	26°34'.20 N 55°23'.55 E	16/12/07	Stony	ZUTC ann.2216	4
	Qeshm Island (32)	26°39'.24 N 55°15'.53 E	16/12/07	Coral and muddy	ZUTC ann.2223	4
	Qeshm Island (24)	26°56'.90 N 56°16'.33 E	14/12/07	Stony	ZUTC ann.2233	2

Species name	Location name (Location number)	Location	Date	Habitat	Code	Number of specimens
	Qeshm Island (25)	26°55'.33 N 56°13'.49 E	15/12/07	Stony-coral	ZUTC ann.2248	1
<i>Sthenelais boa</i> (Johnston, 1833)	Qeshm Island (23)	?	02/01/07	Rocky-sandy	ZUTC ann.2046	3
	Kong Jetty (9)	26°34'.85 N 54°55'.60 E	15/02/07	Rocky-stony covered with algae	ZUTC ann.2047	1
	Qeshm Island (22)	?	06/01/07	Rocky-stony with algae	ZUTC ann.2048	3
	Chabahar (3)	25°21'.08 N 60°35'.94 E	21/10/06	Rocky-stony	ZUTC ann.2049	1

Distribution: This is a new record for the Gulf of Oman. For further information about the general distribution of this species see Wehe (2006).

Lepidonotus purpureus Potts, 1910

Figs 3 a–e

Lepidonotus purpureus Potts 1910. — The Transactions of the Linnean Society Series 2, Zoology 8: 334, pl. 18: fig. 3; Rasheed and Mustaquim 2003, Pakistan Journal of Marine Sciences 12(1): 66–70, fig. 11; Wehe 2006, Fauna of Arabia 22: 105–107, fig. 23 a–i.

Type locality: East Africa.

Material examined: ZUTC ann.2044

Measurements ($n = 2$): Length 9.36 – 13.05 (11.34), width 4.65–5.10 (4.87).

Remarks: The specimen is similar to those described by Wehe (2006). No sub-terminal swelling on antennae was observed here (Fig. 3a). Moreover, notochaetae are missing on all parapodia of the specimen studied.

Distribution: This is a new record for the Gulf of Oman.

Lepidonotus tenuisetosus Gravier, 1902

Lepidonotus tenuisetosus. — Mohammad 1971, Journal of Zoology 163: 288; Ben-Eliahu 1972, Israel Journal of Zoology 21:195; Rasheed and Mustaquim 2003, Paki-

stan Journal of Marine Sciences 12(1): 70–72, fig. 12; Barnich et al. 2004, Species Diversity 9: 300–301; Wehe 2006, Fauna of Arabia 22: 107–109, fig. 24 a–l.

Type locality: Djibouti, Gulf of Tadjoura, Gulf of Aden.

Material examined: ZUTC ann. 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2215, 2042, 2224, 2232, 2235, 2245.

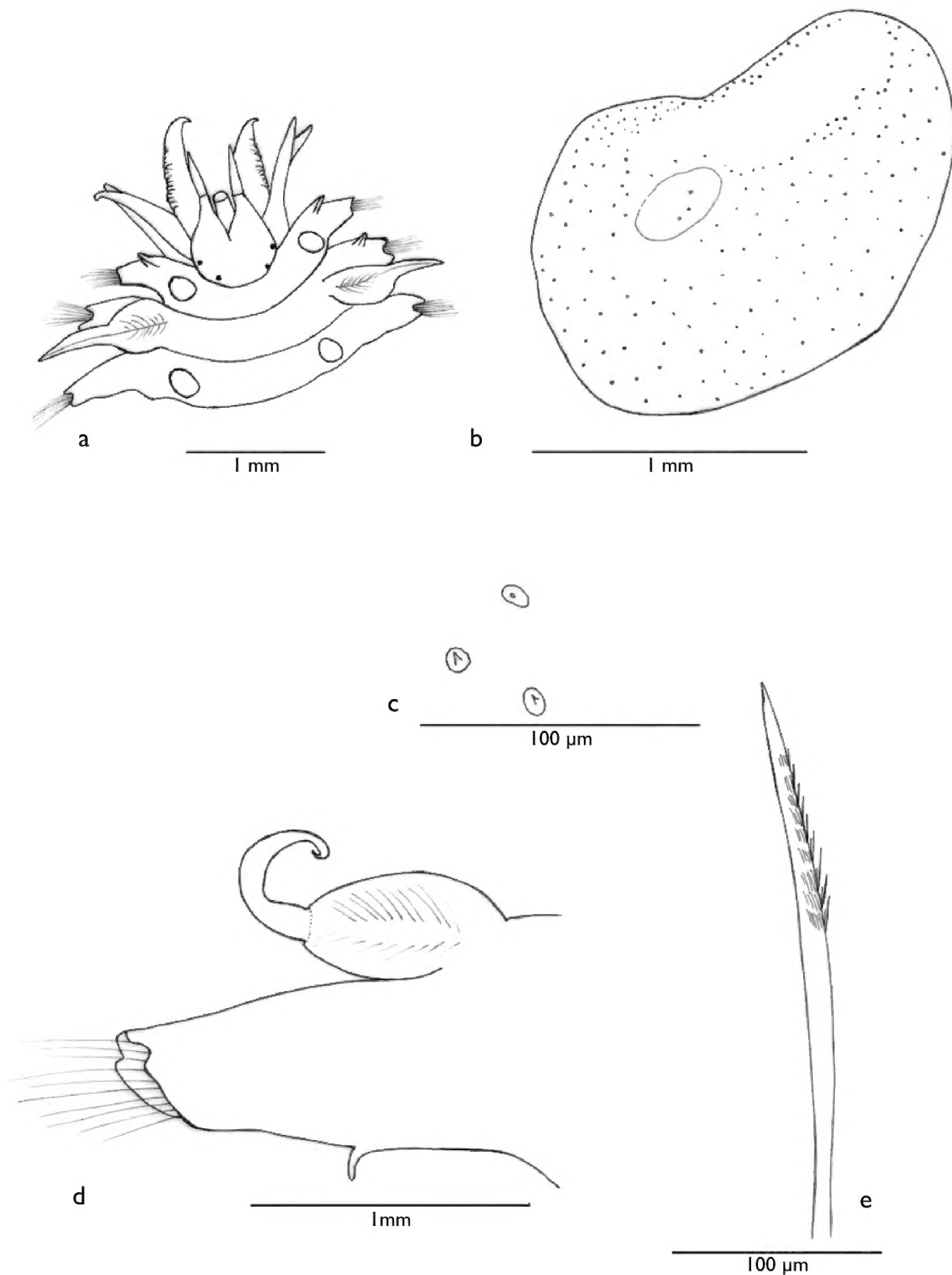


Figure 3. *Lepidonotus purpureus*. **a** anterior end, dorsal view **b** 3rd left elytron **c** microtubercles **d** 3rd right parapodium, anterior view **e** neurochaeta.

Measurements ($n = 185$): Length 6.49–19.20 (13.04), width 2.07–7.06 (4.14).

Distribution: For further information see Wehe (2006).

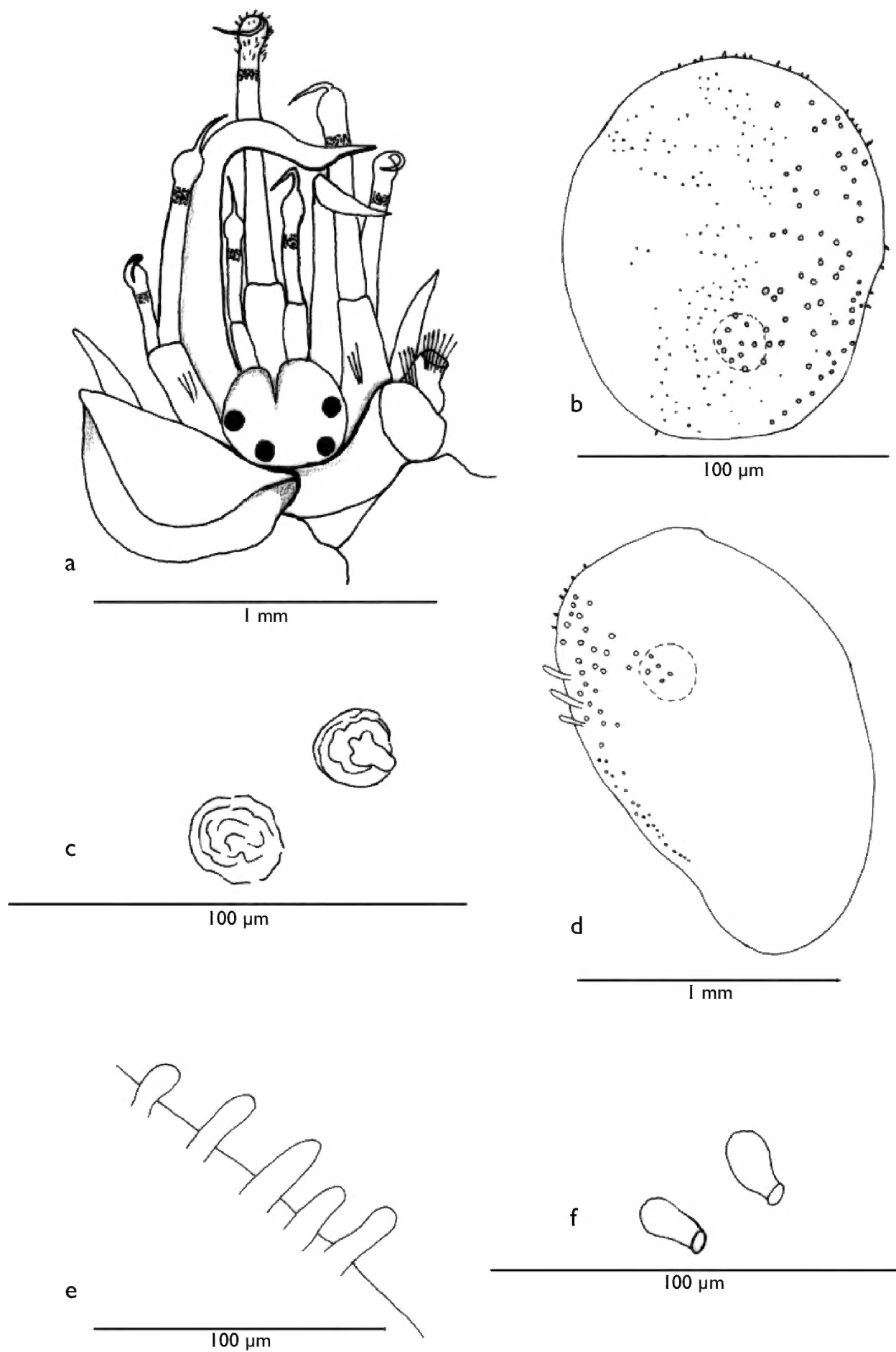


Figure 4. *Parahalosydropsis arabica*. **a** anterior end, dorsal view **b** 1st right elytron **c** microtubercles of lateral elytra surface from **b** **d** elytron from posterior end **e** fringing papillae from **b** **f** balloon-shaped papilla on surface of posterior elytron.

***Parahalosydropsis arabica* Wehe, 2006**

Figs 4a–f, Figs 5a–d

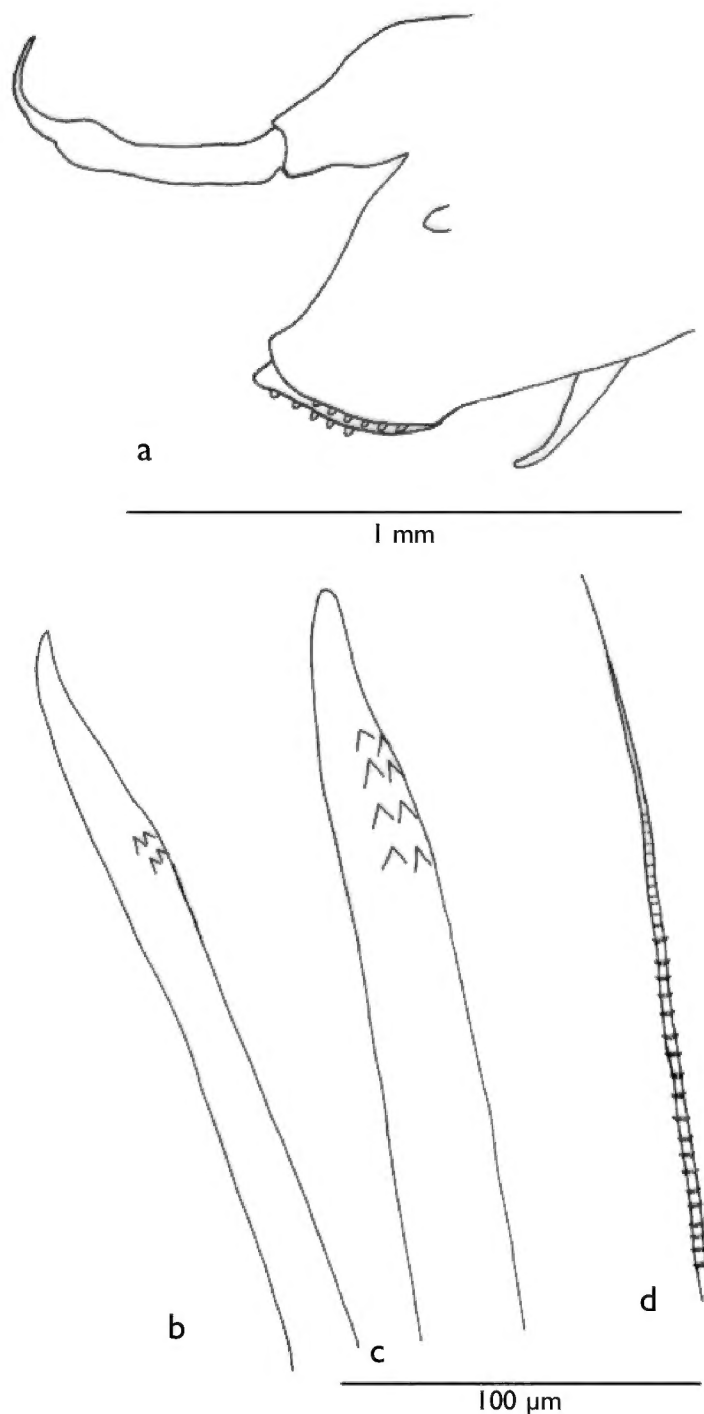
Parahalosydropsis arabica Wehe 2006. — Fauna of Arabia 22: 112–114, fig. 25a–m.**Type locality:** Sudan, Red Sea**Material examined:** ZUTC ann. 2038.**Measurements** ($n = 1$): Length 33, width 3.**Remarks:** The specimen reported here is similar to those described by Wehe (2006), who recorded for the specimens seen by him that on the more posterior elytra, the fringing papillae disappeared. This differs from the specimens we collected as they are clearly visible here (Fig. 4d).**Distribution:** This is a new record for the Gulf of Oman.

Figure 5. *Parahalosydropsis arabica*. **a** 12th left parapodium, posterior view **b** lower neurochaeta **c** upper neurochaeta **d** notochaeta.

***Thormora jukesii* Baird, 1865**

Figs 6a–g, Figs 7a–d

Thormora jukesii. —Rasheed and Mustaquim 2003, Pakistan Journal of Marine Sciences 12(1): 79–81, fig. 16; Barnich et al. 2004, Species Diversity 9: 301; Wehe 2006, Fauna of Arabia 22: 117–119, fig. 27a–o.

Lepidonotus (Thormora) jukesii. — Ben-Eliahu 1977, Israel Journal of Zoology 25: 158.

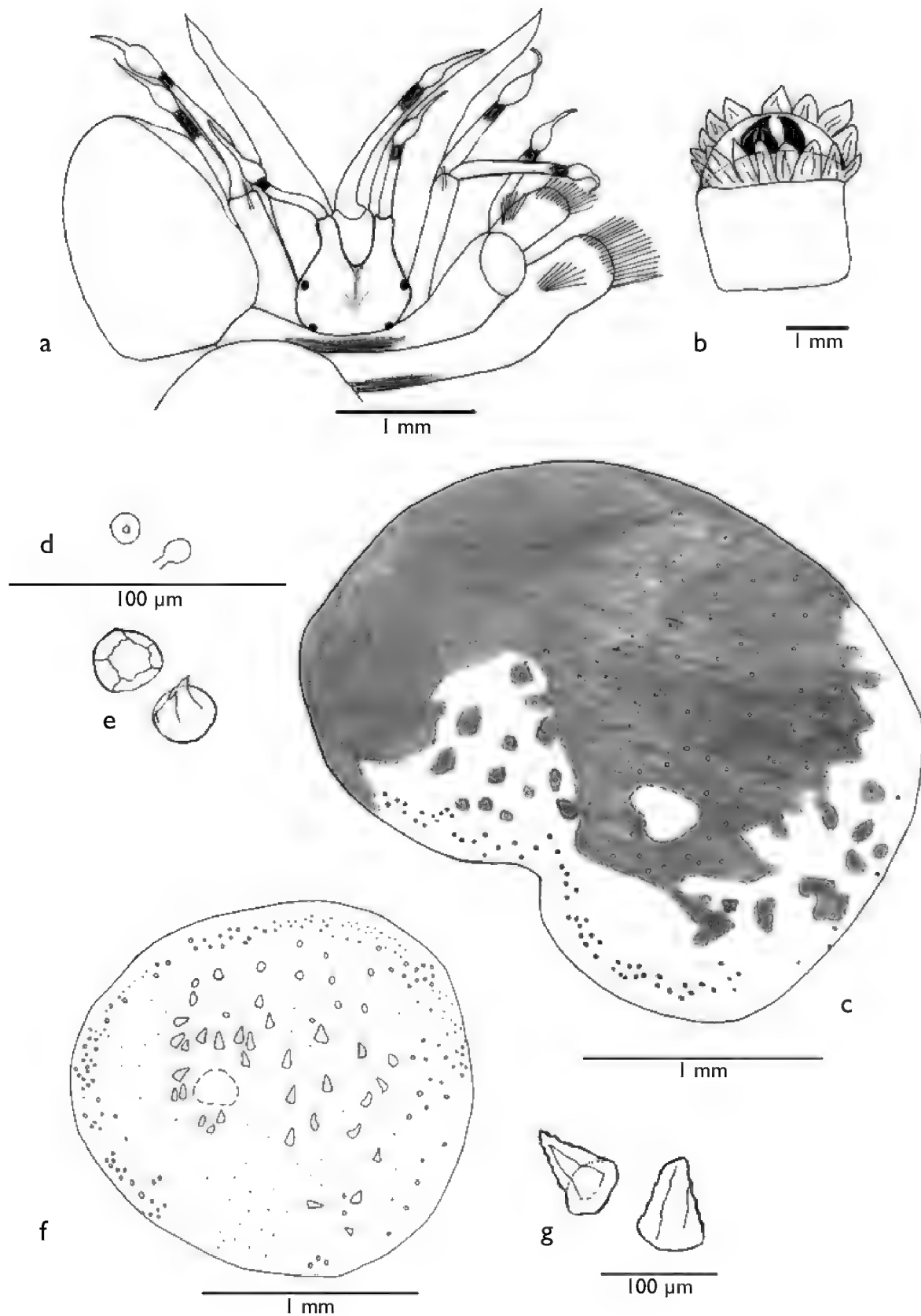


Figure 6. *Thormora jukesii*. **a** anterior end, dorsal view **b** everted proboscis **c** 2nd left elytron **d** globular papillae on surface of first elytron **e** microtubercles **f** 1st right elytron **g** macrotubercles on surface of first elytron.

Type locality: Australia?

Material examined: ZUTC ann. 2039, 2230, 2234.

Measurements ($n = 9$): Length 17.55–24.18 (21.19), width 4.3–8.19 (6.6).

Remarks: According to Wehe (2006), there are microtubercles on the elytra of *Thormora jukesii*, usually confined to the lateral part of the surface of the body. They are numerous from the second pair of elytra onwards. Additionally, small globular papillae are found scattered along the margin of the body. However, on specimens of *T. jukesii* found in Hengam Island, the microtubercles decreased from the second pair of the elytra onward, and globular papillae along the margin of specimens were missing (Fig. 6c, f).

Distribution: This is a new record for the Gulf of Oman.

Subfamily Polynoinae

Harmothoe hirsuta Johnson, 1897

Harmothoe hirsuta. — Wehe 2006, Fauna of Arabia 22: 136–138, fig. 34a–g.

Type locality: San Pedro, California, Northeast Pacific.

Material examined: ZUTC ann. 2022, 2023, 2024, 2025.

Measurements ($n = 10$): Length 10.99–16.83 (13.4), width 4.36–5.75 (4.7).

Distribution: This is the first record for the Gulf of Oman.

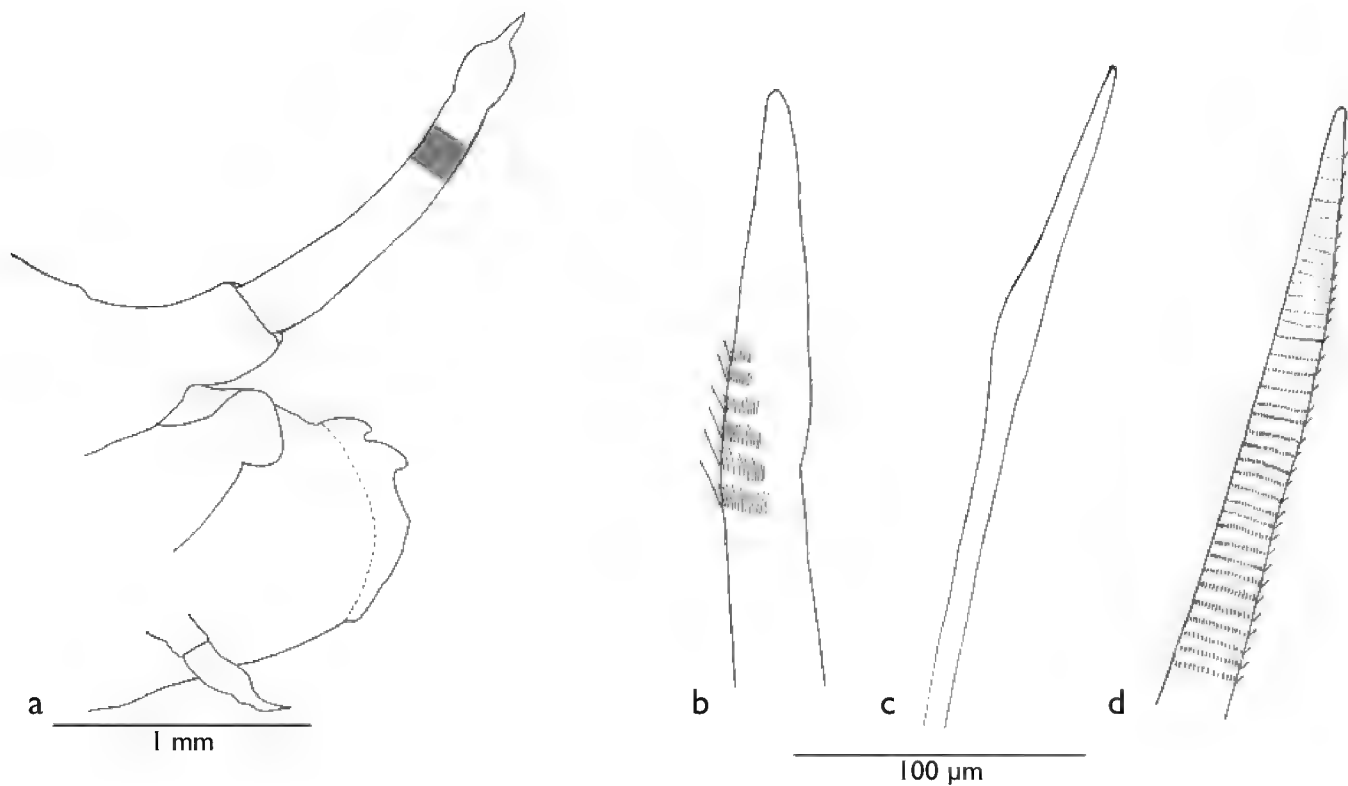


Figure 7. *Thormora jukesii*. **a** 9th left parapodium, anterior view **b** neurochaeta **c** lower notochaeta **d** upper neurochaeta.

***Harmothoe liaoi* Barnich, Fiege & Sun 2004**

Figs 8 a–h

Harmothoe liaoi Barnich, Fiege & Sun, 2004. — Species Diversity 9: 307–309, fig. 4;
Wehe 2006, Fauna of Arabia 22: 138–141, fig. 35a–k.

Type locality: Yezhu Island, Yalong Bay, Hainan Island, South China Sea.

Material examined: ZUTC ann. 2041.

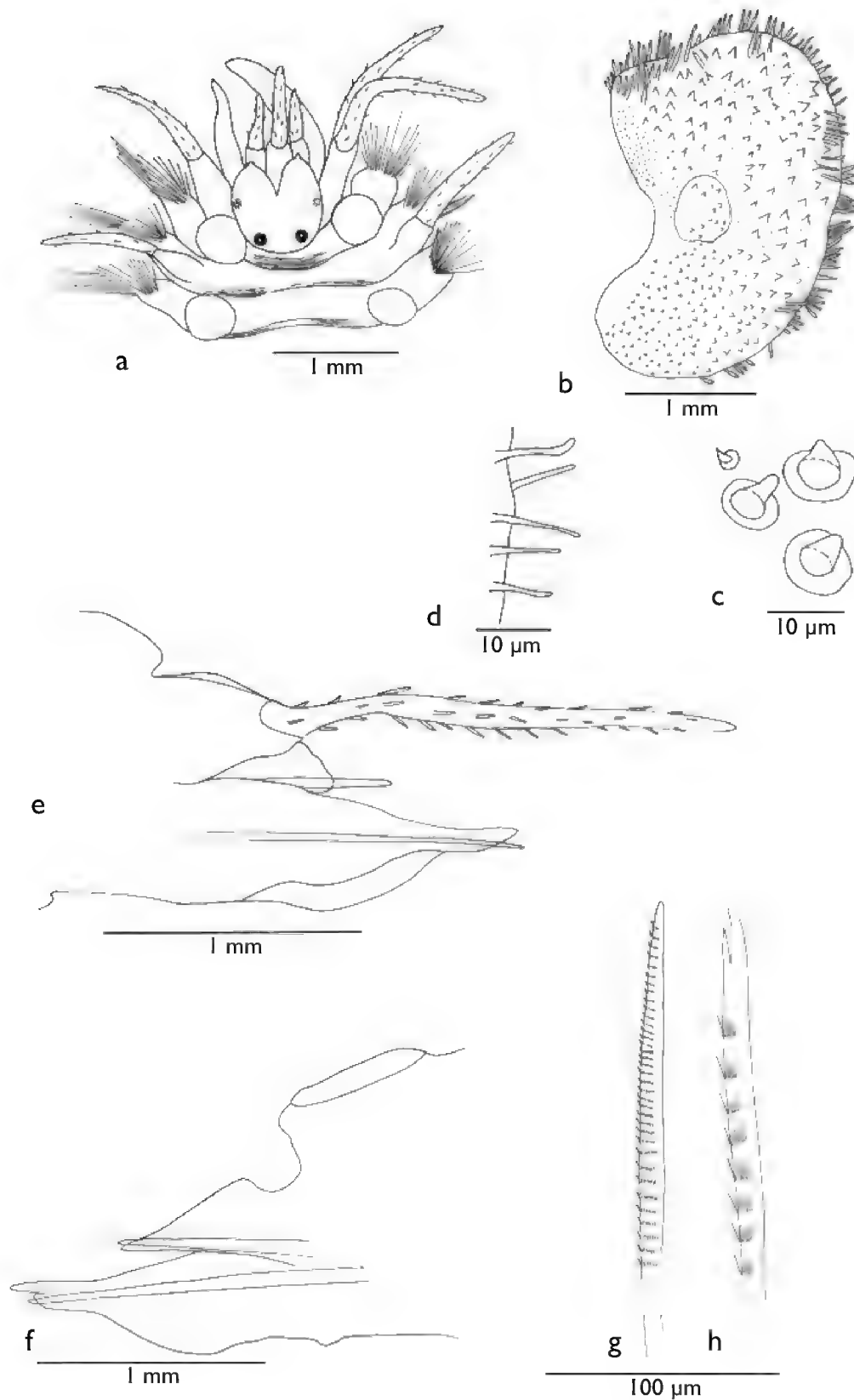


Figure 8. *Harmothoe liaoi*. **a** anterior end, dorsal view **b** 2nd right elytron **c** microtubercles **d** papillae on elytra margin **e, f** parapodium of middle segment: **e** posterior view **f** anterior view **g** notochaeta **h** neurochaeta.

Remarks: The only specimen examined here was broken into three parts, so no measurements were taken. Nephridial papillae from segment 7 onwards as described by Barnich et al. (2004) could not be observed in our specimen (Fig. 8 a, e).

Distribution: This is the first record for the Gulf of Oman.

Harmothoe marerubrum Wehe, 2006

Harmothoe marerubrum. — Wehe 2006, Fauna of Arabia 22: 141–143, fig. 36a–l.

Type locality: Sinai Peninsula, Gulf of Suez, Red Sea, Egypt.

Material examined: ZUTC ann. 2045.

Measurements ($n = 1$): Length, 12.79, width 4.71 mm.

Distribution: Gulf of Suez (Red Sea) (Wehe 2006). This is the first record for the Persian Gulf.

Paralepidonotus ampulliferus (Grube, 1878)

Figs 9 a–l, Figs 10 a–d

Polynoe ampullifera. — Wesenberg-Lund 1949, Danish scientific investigations in Iran 4: 253–255.

Paralepidonotus ampulliferus. — Hanley 1991, Invertebrate Taxonomy 4: 1055–1062, figs 1–5; Rasheed & Mustaqim 2003, Pakistan Journal of Marine Sciences 12(1): 76–77, fig. 15; Barnich et al. 2004, Species Diversity 9: 315–316; Wehe 2006, Fauna of Arabia 22: 159–161. fig. 43a–m, pl. 1f.

Type locality: Bohol Island, Philippines.

Material examined: ZUTCann. 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2120, 2216, 2223, 2233, 2248.

Measurements ($n = 47$): Length 10.83–28.62 (20.05), width 4.44–9 (8.91) mm.

Distribution: Gulf of Suez (Red Sea) (Wehe 2006), and Persian Gulf (Wesenberg-Lund 1949). This is the first record for the Gulf of Oman.

Family Sigalionidae

Sthenelais boa (Johnston, 1833)

Figs 11 a–j

Sthenelais boa. — Wesenberg-Lund 1949, Danish scientific investigations in Iran 4: 257; Mohammad 1971, Journal of Zoology 163: 288; Wehe 2007, Fauna of Arabia 23: 102–104, fig. 20a–k.

Type locality: Great Britain.

Material examined: ZUTC ann. 2046, 2047, 2048, 2049.

Measurements ($n = 8$): Length, 26–110 (64.42), width 3.43–6.13 (5.17).

Remarks: On some specimens a few ampulla-shaped structures with a stem could be observed on the elytra.

Distribution: This is the first record for this species for the Gulf of Oman.

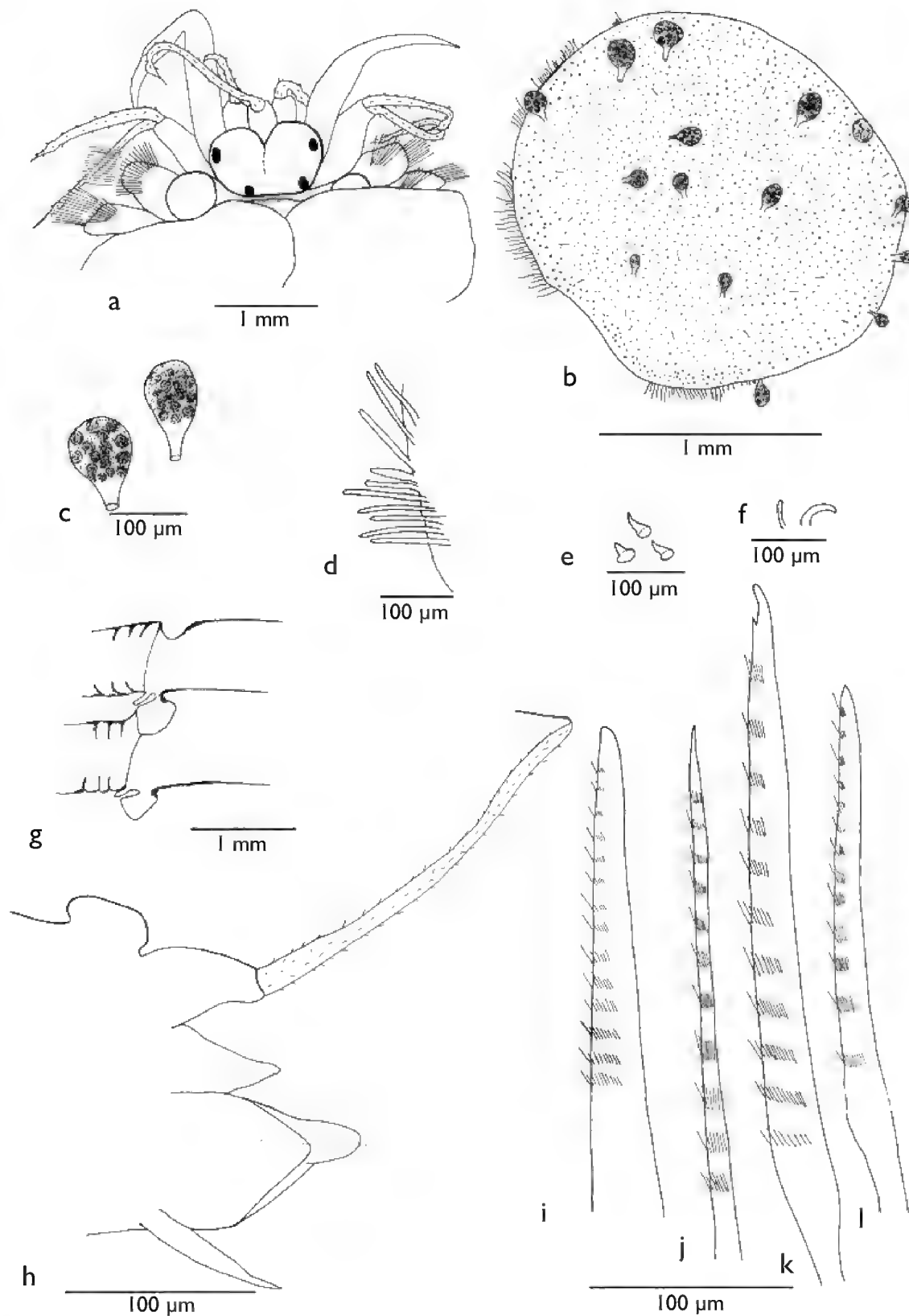


Figure 9. *Paralepidonotus ampulliferus*. **a** anterior end, dorsal view **b** 1st right elytron **c** ampullae on elytra **d** fringing papillae **e** microtubercles **f** papillae on surface **g** ventral lamellae **h** 21st left parapodium, anterior view **i** notochaeta **j** upper neurochaeta **k** middle neurochaetae **l** lower neurochaeta.

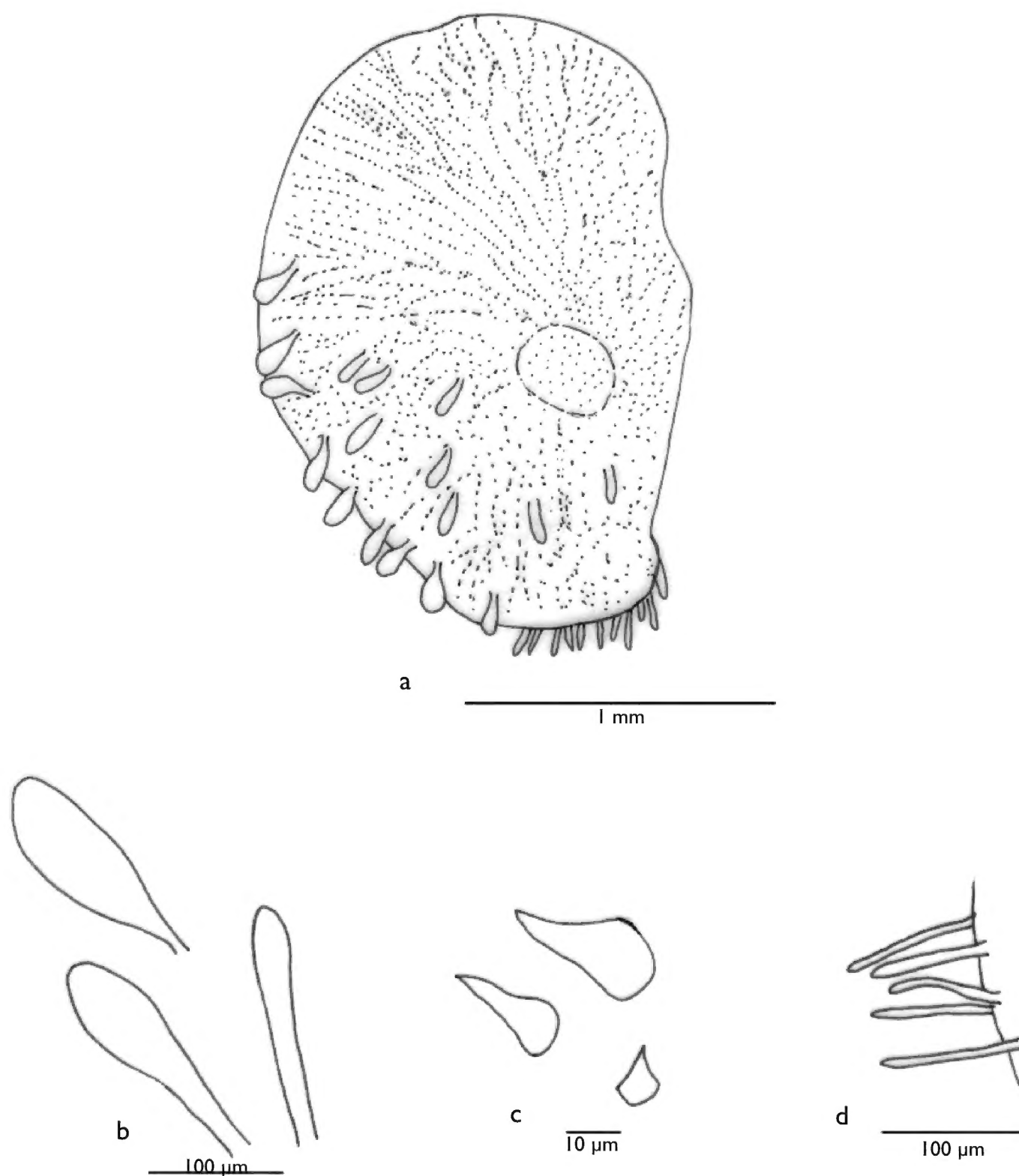


Figure 10. *Paralepidonotus ampulliferus*. **a** middle elytron **b** ampullae on elytra **c** microtubercles **d** fringing papillae.

Conclusion

The genera *Lepidonotus* and *Harmothoe* were the most prevalent in our samples, each of them represented with three species. *Lepidonotus tenuisetosus* was most frequently encountered and collected from 25 locations. The highest diversity of scale worms found during this study originated from rocky habitats covered with a dense layer of algae.

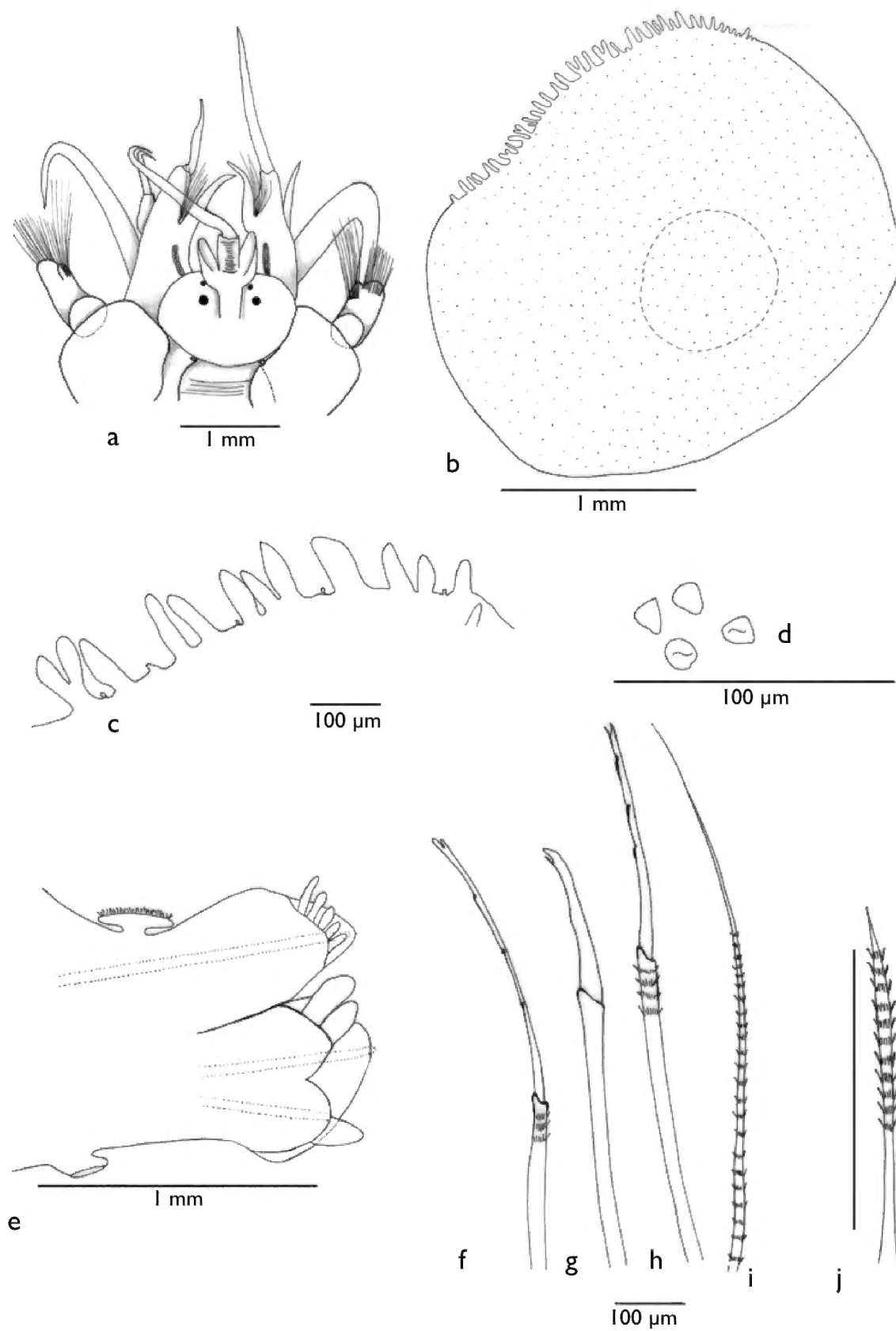


Figure 11. *Sthenelais boa*. **a** anterior end, dorsal view **b** 1st right elytron **c** fringing papillae **d** microtubercles **e** 7th right parapodium, anterior view **f** lower neurochaeta **g** middle neurochaeta **h** upper neurochaeta **i** notochaeta **j** simple neurochaeta.

The high number of new records demonstrates that a much higher diversity of scale worms and polychaetes in general is present on the north-eastern coasts of the Persian Gulf as well as from the northern coasts of the Gulf of Oman than known so far. It can be expected that more intensive fieldwork in additional stations will yield additional records for this relatively unexplored coast.

Acknowledgement

The authors greatly acknowledge the suggestions of Dr. T. Wehe, Zoological Institute, University of Heidelberg, who helped to identify the specimens examined here. We would also like to express our gratitude to Dr. D. Fiege, Research Institute and Natural History Museum Senckenberg, Frankfurt am Main, who gave us the possibility to use his library and literature. We also thank for the financial help and facilities provided by the University of Tehran.

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